

Claims

1. A supported catalyst system suitable for the polymerisation of olefins comprising

(a) a transition metal compound,

(b) an activator comprising

5 (i) an aluminoxane or

(ii) a Group IIIA (CAS Version) metal or metalloid compound, and

(c) a support material comprising an inorganic metal oxide, inorganic metal halide or polymeric material or mixtures thereof

characterised in that the support material has been pretreated with a source of a

10 transition metal atom.

2. A supported catalyst system according to claim 1 wherein the support material is silica.

3. A supported catalyst system according to either of the preceding claims wherein the transition metal compound is a metallocene.

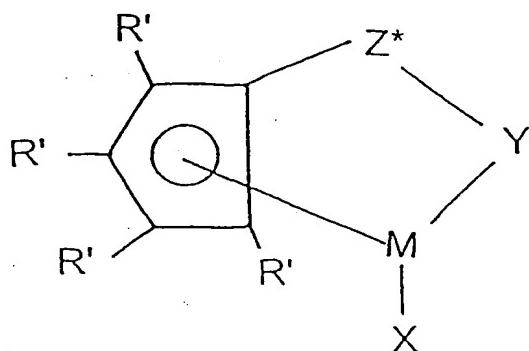
15 4. A supported catalyst system according to claim 3 wherein the metallocene has the formula:



20 wherein Cp is a single cyclopentadienyl or substituted cyclopentadienyl group optionally covalently bonded to M through a substituent, M is a Group VIB (CAS Version) metal bound in a η^5 bonding mode to the cyclopentadienyl or substituted cyclopentadienyl group, X each occurrence is hydride or a moiety selected from the

group consisting of halo, alkyl, aryl, aryloxy, alkoxy, alkoxyalkyl, amidoalkyl, siloxyalkyl etc. having up to 20 non-hydrogen atoms and neutral Lewis base ligands having up to 20 non-hydrogen atoms or optionally one X together with Cp forms a metallocycle with M and n is dependent upon the valency of the metal.

- 5 5. A supported catalyst system according to claim 3 wherein the metallocene is represented by the general formula:



wherein:-

R' each occurrence is independently selected from hydrogen,

- 10 hydrocarbyl, silyl, germyl, halo, cyano, and combinations thereof, said R' having up to 20 nonhydrogen atoms, and optionally, two R' groups (where R' is not hydrogen, halo or cyano) together form a divalent derivative thereof connected to adjacent positions of the cyclopentadienyl ring to form a fused ring structure;

X is a neutral η^4 bonded diene group having up to 30 non-hydrogen

- 15 atoms, which forms a π -complex with M;

Y is -O-, -S-, -NR*-, -PR*-,

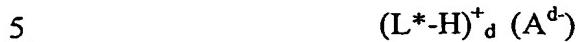
M is titanium or zirconium in the + 2 formal oxidation state;

Z* is SiR*₂, CR*₂, SiR*₂SIR*₂, CR*₂CR*₂, CR*=CR*, CR*₂SIR*₂, or GeR*₂, wherein:

- 20 R* each occurrence is independently hydrogen, or a member selected from hydrocarbyl, silyl, halogenated alkyl, halogenated aryl, and combinations thereof, said R* having up to 10 non-hydrogen atoms, and optionally, two R* groups from Z* (when R* is not hydrogen), or an R* group from Z* and an R* group from Y form a ring

system.

6. A supported catalyst system according to any of the preceding claims wherein the activator may be represented by the formula:



wherein

L* is a neutral Lewis base

(L*-H)⁺_d is a Bronsted acid

10 A^{d-} is a non-coordinating compatible anion of a Group IIIA (CAS Version) metal or metalloid having a charge of d-, and
d is an integer from 1 to 3.

7. A supported catalyst system according to claim 6 wherein the activator
15 comprises a cation and an anion wherein the anion has at least one substituent comprising a moiety having an active hydrogen.

8. A supported catalyst system according to any of the preceding claims wherein the activator is a fluorine containing Group IIIA metal or metalloid compound.

9. A supported catalyst system according to any of the preceding claims wherein
20 the Group IIIA metal of the activator is boron.

10. A supported catalyst system for the polymerisation of olefins comprising
 (a) a transition metal compound,
 (b) a cocatalyst comprising an organometallic compound, and
 (c) a support material comprising an inorganic metal oxide, inorganic metal
25 halide or polymeric material or mixtures thereof
characterised in that the support material has been pretreated with a source of a transition metal atom.

11. A supported catalyst system according to any of the preceding claims wherein the source of the transition metal atom is a transition metal salt.

30 12. A supported catalyst system according to claim 11 wherein the transition metal is iron or copper.

13. A supported catalyst system according to claim 11 wherein the transition metal salt is ferrous sulphate, cupric sulphate or ferrous D-gluconate.

14. A supported catalyst system according to any of the preceding claims wherein the transition metal content on the support material is in the range 0.0001 % to 10 %.

15. A process for the polymerisation of olefin monomers selected from (a) ethylene, (b) propylene (c) mixtures of ethylene and propylene and (d) mixtures of (a), (b) or (c)

5 with one or more other alpha-olefins, said process performed under polymerisation conditions in the presence of a supported catalyst system according to any of the preceding claims.

16. A process for the polymerisation of ethylene or the copolymerisation of ethylene and α -olefins having from 3 to 10 carbon atoms, said process performed under

10 polymerisation conditions in the present of a supported catalyst system according to claims 1 to 14.

17. A process according to claims 15 or 16 wherein the alpha-olefins are 1-butene, 1-hexene, 4-methyl-1-pentene and 1-octene.

18. A process according to claims 15 to 17 carried out in the gas phase.

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